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TIMBER MANAGEMENT OPPORTUNITIES FOR NEBRASKA 1983-1992

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ABSTRACT.--Reviews opportunities for treatment of timber stands in Nebraska for the decade 1983-1992. Under the assumptions and management guides specified, 52 percent of Nebraska's commercial forest land would benefit from timber harvest or some other form of treatment during the decade.

KEY WORDS: Forest management, timber harvest, growing stock volume, board foot volume, commercial forest.

Forest Inventory and Analysis (or Forest Survey) is a continuing endeavor as mandated by the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974. The objective is to periodically inventory our Nation's forest land to determine the magnitude, condition, volume, growth, and depletions. In 1982, the North Central Forest Experiment Station, Forest Inventory and Analysis Project, conducted the third inventory of forest lands in Nebraska.

Nebraska is not heavily forested; however, the region has 718 thousand acres of forest land that are vital to the quality of life in the area. Although most wooded acres are in scattered pockets and narrow bands along rivers and streams (fig. 1), they provide shelter and protection for homes, farmsteads, fields, livestock, and wildlife as well as producing wood fiber. Approximately 538 thousand acres are commercial forest land capable of producing commercial crops of timber and have not been withdrawn from utilization by statute or administrative regulation. The area of land by land class in Nebraska for 1983 is listed below[1]:

Land class	Area (Thousand acres)
Forest land	
Commercial forest	538
Noncommercial forest	180
Total forest land	718
Nonforest land	
Wooded strips	262
Windbreaks	139
Wooded pasture	78
Other nonforest	47,853
Total nonforest land	48,332
Total all land	49,050

The potential for managing commercial forest land in Nebraska is the subject of this Note. In it we identify ways to manage or "treat" forests under the conditions we project will prevail in Nebraska during the decade 1983-1992. The kinds of management or treatments we considered were (1) har-

[1]*Acreages of forest land and nonforest land with trees can not be compared directly with the 1955 USDA Forest Service inventory or the inventory conducted by the Nebraska Forest Service in 1977 due to definitional changes.*

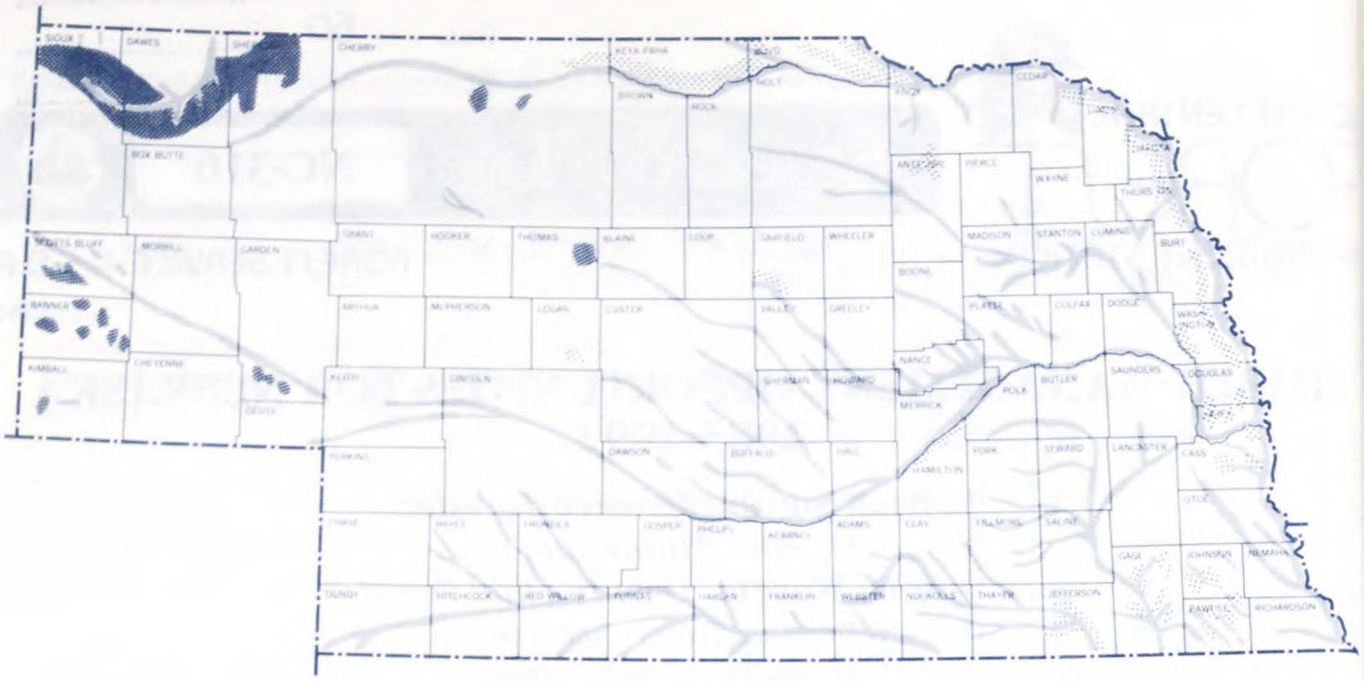

Figure 1.--*Major forest types in Nebraska, 1983.*

vesting, (2) thinning or timber stand improvement (commercial and noncommercial), and (3) stand conversion or restocking. According to the site index for each forest type, we decided the rotation age for harvest, what pre-thinning and post-thinning basal areas should be, and age limits for thinning (i.e., the harvest and timber stand improvement criteria, table 1). From these criteria we determined the area of forest qualifying for each treatment (table 2). Volumes were tabulated for each of those stands selected for treatment, and represent the volume that could be removed if the treatment were carried out (table 3).

The harvest and timber stand improvement criteria were adapted from criteria used in other Plains States. They reflect feasible timber management practices for current conditions on commercial forest land in Nebraska.

There is no single or "correct" estimation of how much land qualifies for timber management in Nebraska. Rather, opportunities vary according to the harvesting and thinning criteria specified. The findings presented are the result of just one set of reasonable criteria.

ASSUMPTIONS

In order to conduct the analysis, three basic assumptions were made: (1) the area of commercial forest land (537,800 acres) will remain stable for the decade 1983-1992, (2) all commercial forest land is available for treatment, and (3) a ready market exists for all species and products. This analysis does not take into account possible economic, social, or political constraints or incentives on timber management opportunities.

METHOD

Timber management opportunities are projected for one decade because this is viewed as a reasonable planning period. In practice, treatments could occur anytime throughout the decade. An estimate of the average annual volumes removed during the treatment period must reflect the growth that would occur on plots between 1982 (when the data were collected) and the time of treatment. For this reason, it was necessary to project an average of 5 years' growth on each stand before treatments were evaluated. Plot data from the Nebraska Forest Inventory were used as input to the Stand and Tree

valuation and Modeling System (STEMS).[2] This ystem "grew" each plot for 5 years and projected ıe basal areas and volumes represented by the ots. After the projection, the following process was ed to identify timber management opportunities.

Identify areas for stand conversion or restocking

The basal area for each plot was compared to the stand age to see if the plot would achieve full stocking. A plot was selected for stand conversion or restocking if plot basal area was < 19 + (0.38 × stand age).

Identify areas for harvest

Criteria outlined (table 1) were used to calculate harvest acreage for each forest type for the decade 1983-1992. All plots at rotation age or above were selected for harvest. Harvest volume is the projected volume found on harvest plots.

Identify areas for thinning

Criteria outlined (table 1) were used to calculate thinning acreage for each forest type for the decade 1983-1992. Stands selected for thinning must be at least 10 years from rotation age. In the oak-hickory forest type, thinning on high productivity sites occurred only in stands less than 51-years-old. Thinning on low productivity sites occurred only in stands less than 41-years-old.

On plots selected for thinning, STEMS assigned the highest thinning priority to cull trees, then growing-stock trees of undesirable species for traditional markets (elm, boxelder, and non-commercial species), and finally growing-stock crop trees. Large diameter growing-stock crop trees were favored for retention during thinning operations. Trees were "thinned" from the plot until the recommended residual basal area was achieved.

The logic used to assign treatments to each forest ventory plot is diagrammed in figure 2.

The volume of timber on commercial forest land commonly reported in two ways – growing-stock lume and sawtimber volume. Both are net vol-ıes of the central stem above a one-foot stump in e trees of commercial species having no serious fects in quality. Growing-stock volume is meas-ed in cubic feet on trees 5 inches d.b.h. and larger a 4-inch top diameter (outside bark). Sawtimber

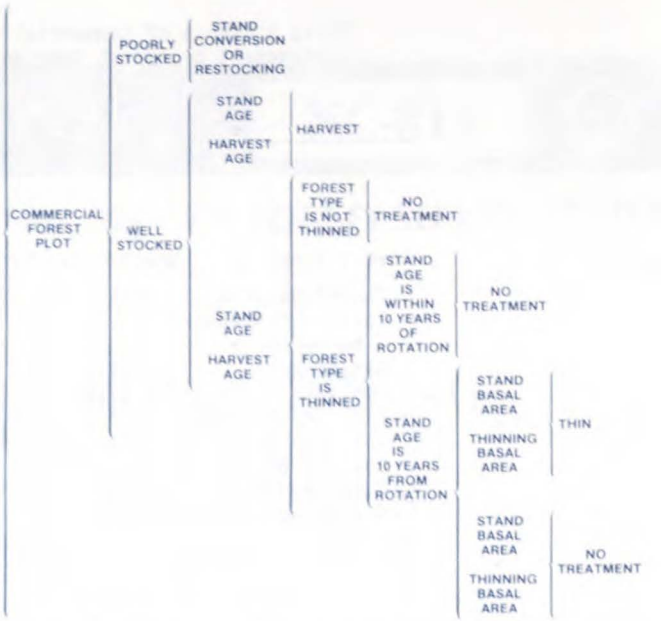

Figure 2.--*Logic used to assign treatments to commercial forest plots.*

volume is measured in board feet, International ¼-inch rule, for softwoods 9 inches d.b.h. and larger to a 7-inch top (outside bark) and hardwoods 11 inches d.b.h. and larger to a 9-inch top (outside bark).

FINDINGS

Harvesting Opportunities

Area

According to the management criteria, 190,700 acres of commercial forest land could be harvested by 1992 (table 2). More than 75 percent of the total cottonwood acreage qualified for harvest as did 58 percent of the Eastern red cedar-hardwood, and 42 percent of the elm-ash-soft maple. In the cottonwood forest type many of the stands are overmature, with nearly two-thirds of the stands more than 10 years past the specified rotation age.

Although some of the harvested stands are on low productivity sites (low site index), nearly one-fourth of the stands have a site index over 60.

Volume

Timber volume harvestable from commercial forest land totals 260 million cubic feet during the decade (table 3), of which 225 million cubic feet came from growing-stock trees. This volume includes 910 million board feet of sawtimber material (table 4).

An average of 1,180 cubic feet of growing-stock would be removed for every acre of commercial for-

[2] *U.S. Department of Agriculture, Forest Service. description of STEMS: The stand and tree evaltion and modeling system. Gen. Tech. Rep. NC-79. Paul, MN: U.S. Department of Agriculture, For-Service, North Central Forest Experiment Sta-n; 1983. 18 p.*

est land harvested. Board foot removals of saw-log material in growing-stock trees averages 4,510 board feet per acre. Growing-stock and sawtimber removals are highest in the cottonwood forest type at 1,693 cubic feet and 6,270 board feet per acre, respectively. These averages do not reflect sustained yields, however, since they include volumes from stands well beyond the specified rotation age. In this analysis, cottonwood stands at an average age of 45 years yielded 1,200 cubic feet of growing stock and 4,700 board feet of sawtimber, respectively.

Forest type	Harvest volume per acre	
	(Cubic feet)	(Board feet)[3]
Ponderosa Pine	1,131	6,241
Eastern redcedar-hardwood	573	2,090
Oak-hickory	—	—
Bur oak	282	1,268
Elm-ash-soft maple	910	2,965
Cottonwood	1,693	6,270
Lowland plains hardwoods	1,402	4,643
All types	1,180	4,510

Thinning Opportunities

Area

During the decade 44,900 acres of commercial forest land qualified for thinning. The ponderosa pine (11,000 acres), elm-ash-soft maple (3,500 acres), oak-hickory (10,600 acres), and lowland plains hardwoods forest types (4,000 acres) were the only types to have stands in need of thinning within the criteria specified.

All the thinned stands were between 30- and 80-years-old. The average site index of stands selected for thinning was 64. Most of the thinnings were in stands less than 20 acres in size.

Volume

The volume from thinnings for the decade totaled 24 million cubic feet, 14 million cubic feet of which came from growing-stock trees. The average growing stock removed during thinnings is 312 cubic feet per acre thinned. Cull tree removal is a priority in thinning operations and 42 percent of all material scheduled for removal during thinning would be cull material.

[3] *International ¼-inch rule.*

Stand Conversion or Restocking Opportunities

Area

In Nebraska 42,300 acres of commercial forest land are poorly stocked and have been targeted for stand conversion or restocking during the decade. These stands are mostly found in the elm-ash-soft maple (17,300 acres), lowland plains hardwoods (8,600 acres), and cottonwood (5,700 acres) forest types. Additionally, 6,100 acres of nonstocked forest land would be restocked. The average site index is 47, and the majority of these areas are comprised of stands less than 20 acres in size.

Volume

If these stands were clearcut prior to stand conversion or restocking, 13 million cubic feet of standing trees could be recovered during the decade--11 million cubic feet in growing-stock trees. This is an average of 260 cubic feet of growing stock removed per acre. This volume per acre includes 827 board feet of sawtimber material.

DISCUSSION

According to the criteria used in this analysis, 277,900 acres of commercial forest land in Nebraska can benefit from timber management during the decade 1983-1992. The most common treatment is harvesting which would be carried out on 190,700 acres during the decade.

The harvesting opportunities identified will not result in a sustained yield from forest land in Nebraska. Sustained yield implies that an even flow of timber volume could be produced by the forest indefinitely. Currently the forests of Nebraska have an accrual of timber in overmature stands in need of harvest or improvement and a backlog of poorly stocked stands in need of restocking. Thus, under a fully regulated forest the sustained annual harvest would differ from that shown here.

The treatments identified here may not be carried out for a number of reasons. Wood production may not be a priority for many land owners--timber management may be incompatible with their ownership objectives. Social or political considerations may limit timber management. Traditional markets may not exist for some of the products removed during the treatment period or distance to market may make some treatments uneconomical. However, in many cases, landowner interest in multiple use benefits such as soil and watershed protection or wildlife enhancement may provide the added incentive

necessary to apply treatment to woodlands where wood production alone is not sufficient incentive. Nontraditional markets such as fuelwood may also provide commercial opportunities and facilities treatment.

In summary, the acreage targeted for timber management in this report is the biological maximum available, given the management criteria and current forest conditions. Forest owners and managers must use their knowledge to temper the findings to fit resource conditions in their areas.

Although this report has been devoted solely to commercial forest land, other excellent opportunities exist for the management of timber on lands not classified as commercial forest such as wooded pasture, wooded strips, and windbreaks, which together cover some 479 thousand acres in the State.

Landowners who would like guidance in obtaining seedling trees, improving their stands, or harvesting timber are advised to contact the Nebraska Forest Service, 101 Plant Industry, University of Nebraska, Lincoln, Nebraska 68583, or their local County Extension Office. Detailed statistical and analytical reports covering other aspects of the recent statewide forest inventory are also available by contacting the Nebraska Forest Service or the Forest Inventory and Analysis Unit, USDA Forest Service, North Central Forest Experiment Station, 1992 Folwell Avenue, St. Paul, MN 55108.

Table 1.--Harvest and timber stand improvement criteria used in assessing timber management opportunities in Nebraska

Forest type	Site index range	Rotation age for harvest	Thinning[1/]	
			Pre-thinning basal area	Post-thinning basal area
	Feet	Years	- - - Square feet - - -	
Ponderosa pine	0-50	100	110	80
	51+	120	110	80
Eastern redcedar-hardwood	All sites	60	--	--
Oak-hickory	0-55	100	90	65[2/]
	56+	80	90	65[3/]
Bur oak	0-55	100	90	65[2/]
	56+	80	90	65[3/]
Elm-ash-soft maple	All sites	70	90	70
Cottonwood	All sites	40	--	--
Lowland plains hardwoods	All sites	70	90	70

[1/] Stands must be more than 10 years from harvest age to be considered for thinning.

[2/] Stands must be less than 41 years old to be considered for thinning.

[3/] Stands must be less than 51 years old to be considered for thinning.

Table 2.--Area of commercial forest land qualifying for timber management by forest type and treatment, Nebraska, 1983-1992

(In thousand acres)

Forest type	All treatments	Treatment			
		Harvest	Thinning	Stand conversion or restocking	No treatment
Ponderosa pine	146.1	27.4	11.1	3.1	104.5
Eastern redcedar-hardwood	42.2	24.4	--	1.5	16.3
Oak-hickory	24.7	--	10.6	--	14.1
Bur oak	37.4	7.1	--	--	30.3
Elm-ash-soft maple	122.0	51.6	19.2	17.3	33.9
Cottonwood	82.8	63.8	--	5.7	13.3
Lowland plains hardwoods	76.5	16.4	4.0	8.6	47.5
Nonstocked	6.1	--	--	6.1	--
All types	537.8	190.7	44.9	42.3	259.9

Table 3.--Growing-stock and cull volume targeted for removal on commercial forest land qualifying for timber management by forest type and treatment, Nebraska, 1983-1992

(In million cubic feet)

Forest type	All treatments		Treatments					
			Harvest		Thinning		Stand conversion or restocking	
	Growing stock	Cull	Growing stock	Cull	Growing stock	Cull	Growing stock	Cull
Ponderosa pine	36	8	31	3	4	4	1	1
Eastern redcedar-hardwood	14	4	14	4	--	--	--	--
Oak-hickory	1	1	--	--	1	1	--	--
Bur oak	2	3	2	3	--	--	--	--
Elm-ash-soft maple	58	13	47	9	7	4	4	--
Cottonwood	110	9	108	9	--	--	2	--
Lowland plains hardwoods	27	8	23	7	2	1	2	--
Nonstocked	2	1	--	--	--	--	2	1
All types	250	47	225	35	14	10	11	2

Table 4.--Sawtimber and short-log cull volume targeted for removal on commercial forest land qualifying for timber management by forest type and treatment, Nebraska, 1983-1992

(In million board feet)[1/]

Forest type	All treatments		Treatments					
			Harvest		Thinning		Stand conversion or restocking	
	Sawtimber	Short-log	Sawtimber	Short-log	Sawtimber	Short-log	Sawtimber	Short-log
Ponderosa pine	175	3	171	2	--	--	4	1
Eastern redcedar-hardwood	52	6	51	6	--	--	1	--
Oak-hickory	--	4	--	--	--	4	--	--
Bur oak	9	--	9	--	--	--	--	--
Elm-ash-soft maple	176	7	153	6	10	1	13	--
Cottonwood	407	8	400	8	--	--	7	--
Lowland plains hardwoods	86	8	76	6	5	1	5	1
Nonstocked	5	1	--	--	--	--	5	1
All types	910	37	860	28	15	6	35	3

[1/] International 1/4-inch rule.

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